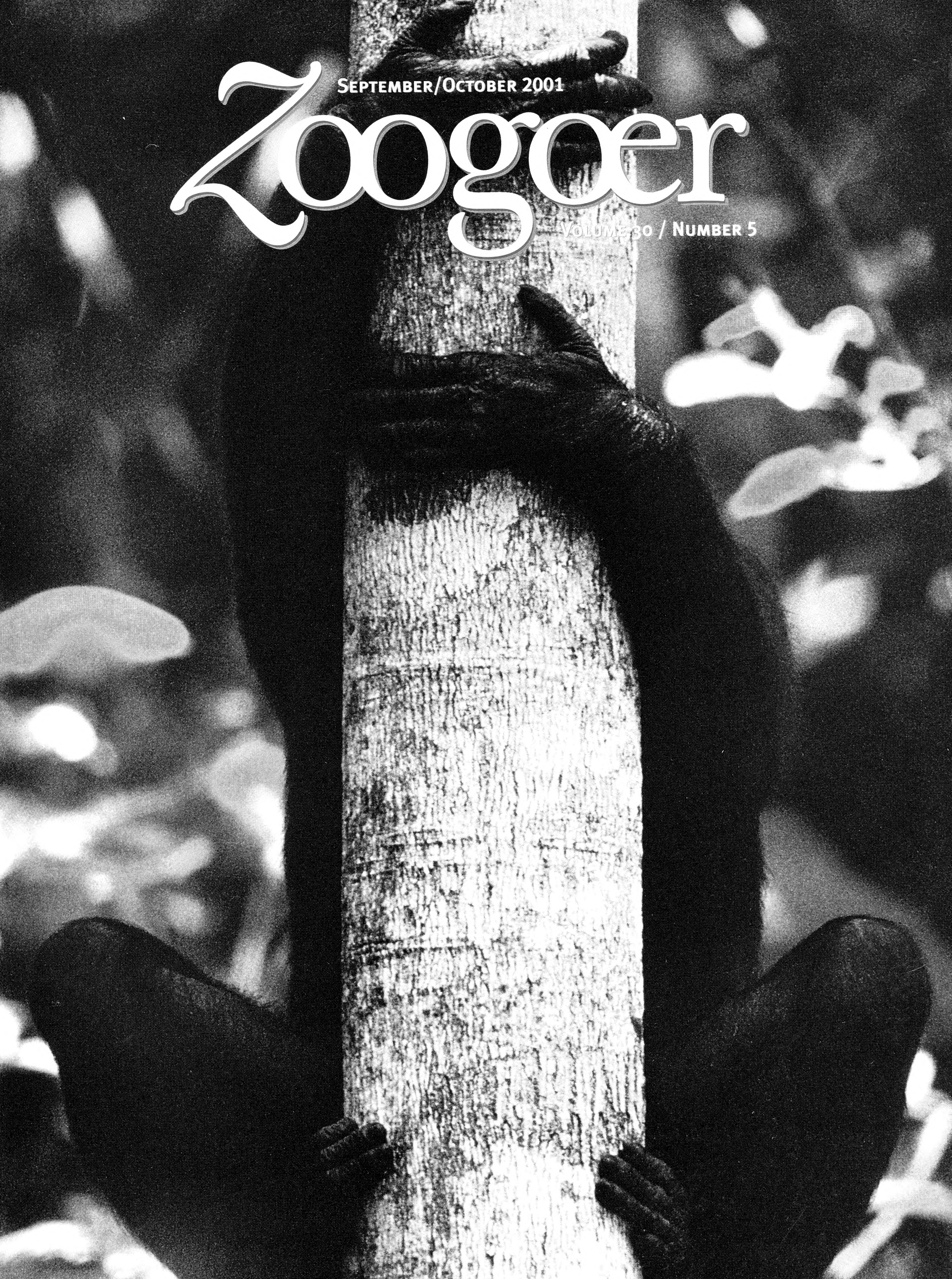


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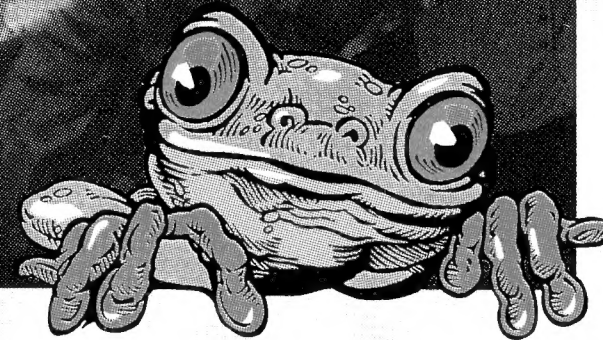
# Zoogoer

VOLUME 30 / NUMBER 5





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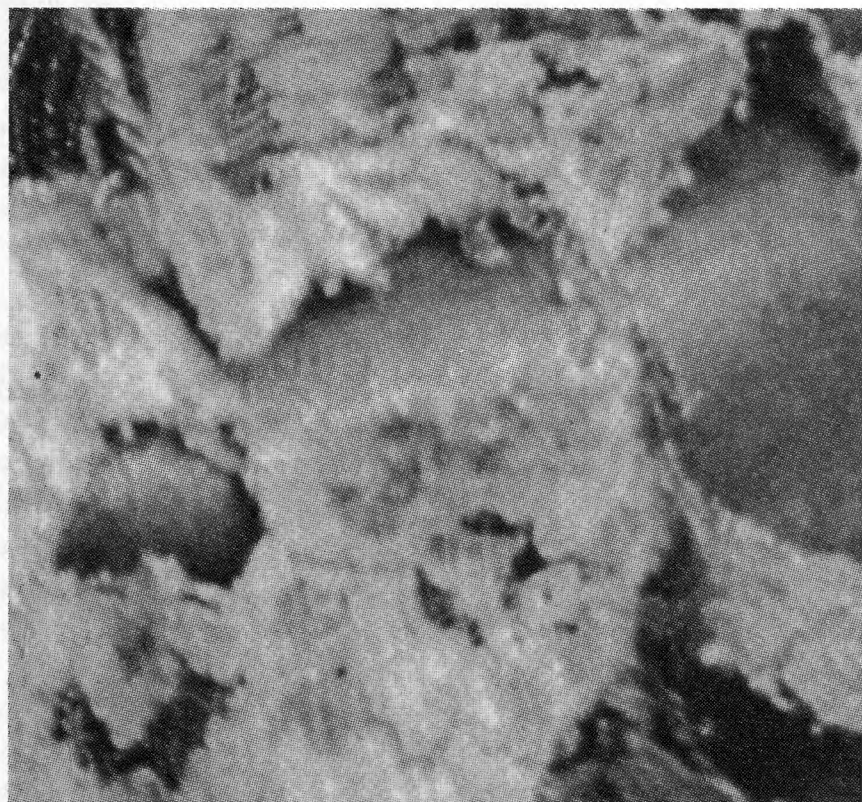
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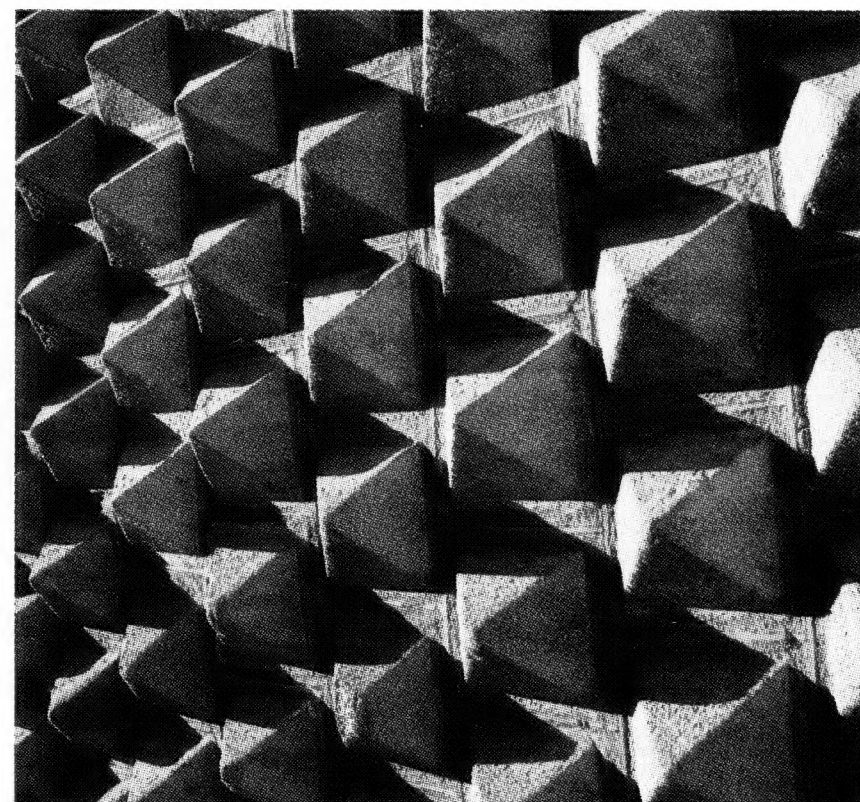
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# MOVING FORWARD

**T**he year 2001 has been an exhilarating one here at the Smithsonian National Zoo. Under new Zoo Director Lucy Spelman's leadership, we are revitalizing fraying exhibits, adding interesting new animals, and coalescing around her vision of integrated conservation, exhibition, and education programs for several high-profile species.

Of course, there is no more high-profile species than our giant pandas, and the Giant Panda Program offers a model for the future. Apart from serving millions of visitors who are coming to admire and learn about giant pandas, we are conducting research on Tian Tian and Mei Xiang so we can better plan the Fujifilm Giant Panda Conservation Habitat. At the same time, we're putting the finishing touches on a giant panda curriculum guide for the classroom and planning a new education initiative on giant pandas and their endangered habitat in China.

We're also offering training to our Chinese colleagues, both here and in China. And we're seeing how the money we are contributing to conservation in China will be helping reserves there. To learn more about this innovative program, visit our Giant Panda Website at <http://pandas.si.edu>. Check out "Around the Rim in Fourteen Days" and other new features about the world's favorite animals. The Zoo Director envisions similarly sweeping programs for sloth bears, Asian elephants, and greater one-horned Asian rhinos. Planning for these is well underway.

Charismatic animal superstars like bears and elephants are the big attractions at the Zoo, but other, less-celebrated species find many fans as well. New brown pelicans are delighting people as much as the sea lions with which they share a pool in Beaver Valley. Three Mexican wolves also made a recent debut in Beaver Valley. These wolves are among only 230 or so of this subspecies alive today, most of which are in zoos. All are part of a cooperative program between zoos and the U.S. Fish & Wildlife Service to restore wolf populations to the wild, where they were extirpated by the 1980s. The USFWS has been reintroducing wolves since 1998, and about 30 to 35 are now living in the wilds of the southwestern U.S. We're excited to be part of this critical conservation effort.

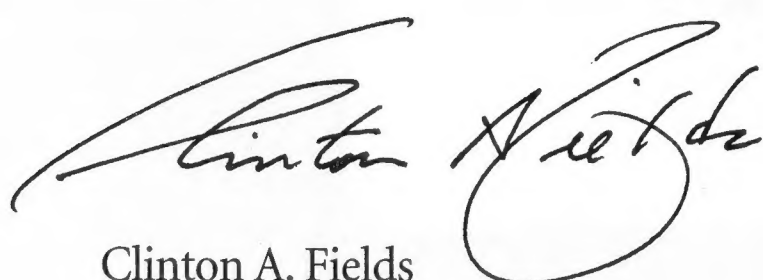
Fall marks the debut of ring-tailed lemurs on Monkey Island. These feisty animals are sure to enliven the center of the Zoo. Native to Madagascar, they will also help call attention to the endangered status of many of this Indian Ocean island's wildlife and habitats.

While caring for our animals, we are planning to enhance the experience of the Zoo for our members and the visiting public. An important step toward this goal is the completion of a new picnic pavilion next to the Mane Restaurant. A beautiful structure, it provides visitors shelter from sun and rain while they enjoy a meal or just take a break. Another step is our environmentally friendly Zoo shuttle that carries people up and down our steep hills and offers rides to the nearby Cleveland Park Metro stop on the Red Line. And we will soon begin a complete renovation of the Mane Restaurant.

Most of these exciting projects would not be possible without the support of our generous members and a growing roster of foundations and corporations that believe in and support the Zoo's work.

We are grateful to all of the individuals and organizations that are Friends of the National Zoo, and we look forward to continued partnerships that will help us achieve our goal of improving the lives and futures of the animals in our care.

Sincerely,



Clinton A. Fields  
Executive Director

## Friends of the National



is a nonprofit organization of individuals, families, and organizations who are interested in helping to maintain the status of the Smithsonian National Zoological Park as one of the world's great

zoos, to foster its use for education, research, and recreation, to increase and improve its facilities and collections, and to advance the welfare of its animals.

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☉ Smithsonian *National Zoological Park* is located at 3001 Connecticut Ave., N.W., Washington, DC 20008-2537. Weather permitting, the Zoo is open every day except December 25. Hours: From May 1 to September 15, grounds are open from 6 a.m. to 8 p.m.; buildings, 10 a.m. to 6 p.m. From September 16 to April 30, grounds are open from 6 a.m. to 6 p.m.; buildings, 10 a.m. to 4:30 p.m.

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**Cover photo:** Bonobo (*Pan paniscus*) in a tree.  
Photo by Frans Lanting.





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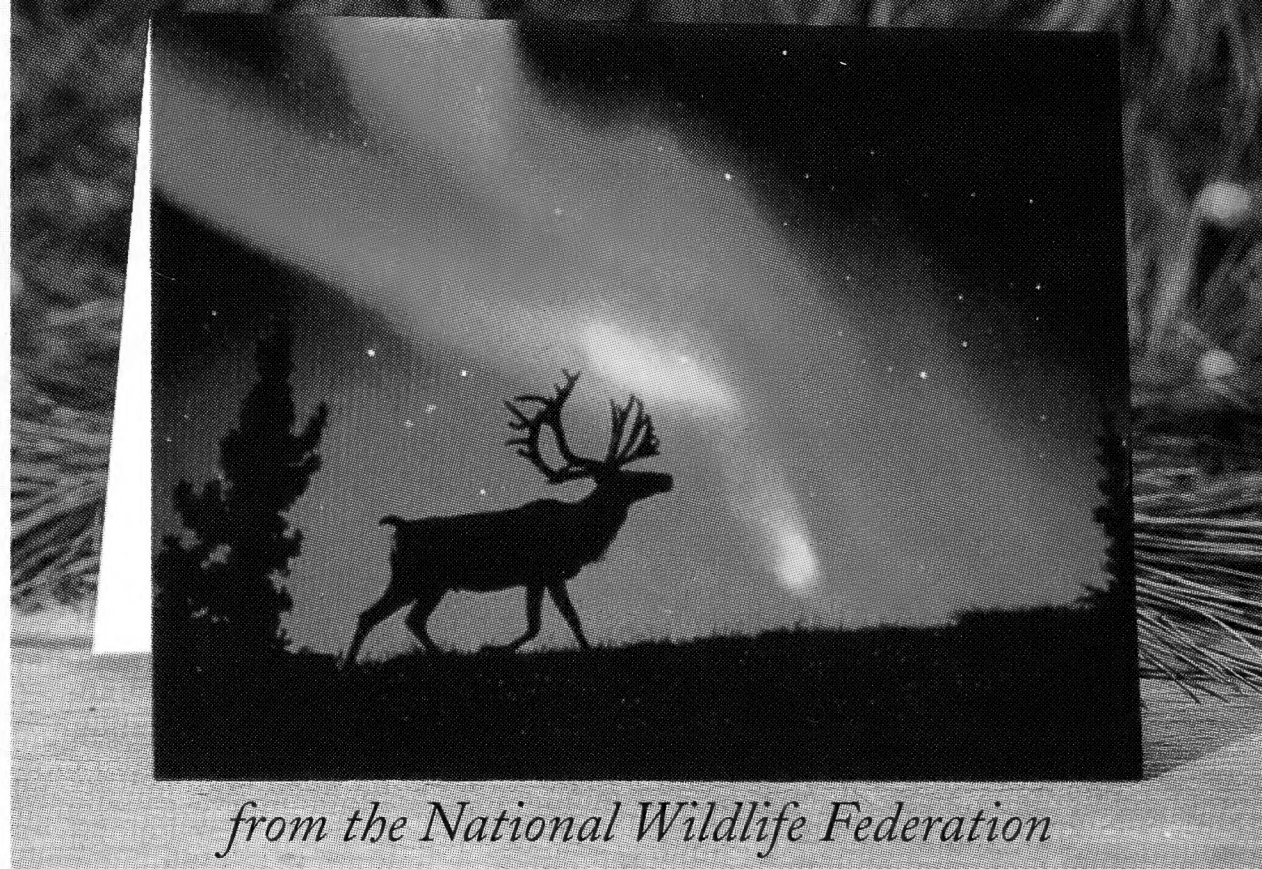
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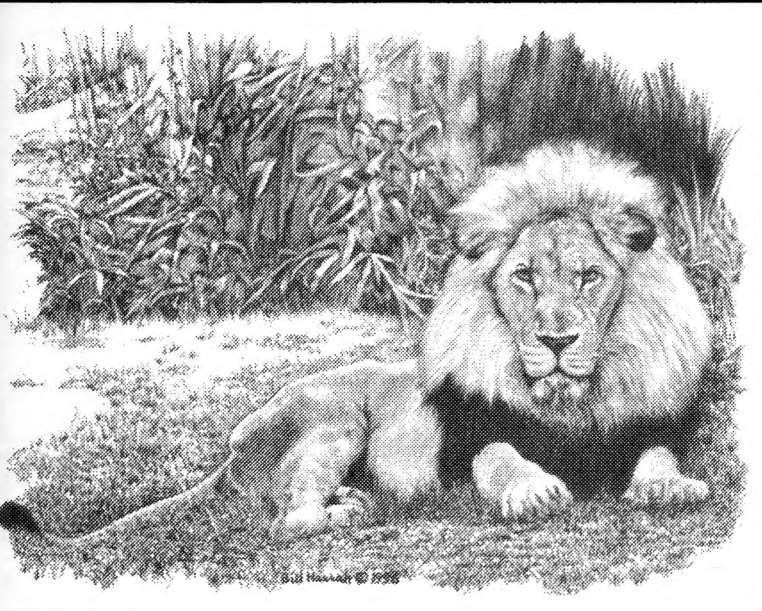
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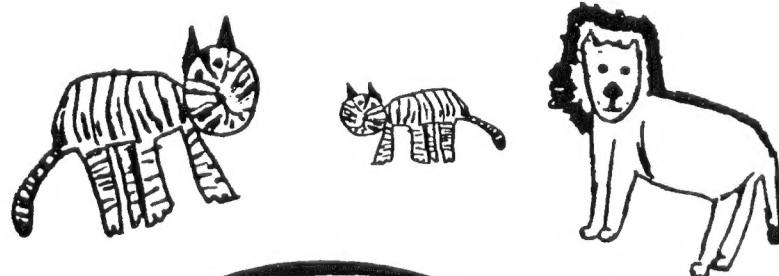


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# NOTES NEWS



PAT VOSBURGH

GOLDEN LION TAMARINS AT THE NATIONAL ZOO.

## GOING FOR THE GOLD

Earlier this year, the Golden Lion Tamarin Conservation Program (GLTCP) celebrated a milestone in the recovery of this small, golden-haired primate. A recent birth

brought the wild population up to 1,000 individuals, from a low of fewer than 300 animals in the early 1970s, when habitat loss and capture for the pet trade had decimated the species.

The March birth brings the project halfway to its goal of establishing a genetically viable wild population of about 2,000 individuals. The GLTCP includes the cornerstone of any conservation program—habitat protection—but the reintroduction of zoo-bred animals adds both numbers as well as valuable genetic material to a critically small population. There are more than 140 zoos worldwide

that participate in a collaborative program for breeding golden lion tamarins (*Leontopithecus rosalia*). Since 1984, 147 zoo-born animals have been released into the wild. Despite these successes, there is more work to be done. To sustain 2,000 animals requires the protection or restoration of an additional 20,000 acres of tamarin-friendly habitat in Brazil's Atlantic coast forest.

Spearheaded by the Smithsonian National Zoo in collaboration with the Rio de Janeiro Primate Center, the conservation program was born of a 1972

conference on the plight of the golden lion tamarin. Today, this program is coordinated by the Zoo, working with collaborators from the Rio de Janeiro Primate Center, the Brazilian government's Institution for the Environment and Natural Resources, the International Golden Lion Tamarin Research and Management Committee, the University of Maryland, and the World Wildlife Fund.

JESSIE COHEN/NZP



MANDARA IS EXPECTING HER FIFTH BABY THIS NOVEMBER.

## GREAT EXPECTATIONS

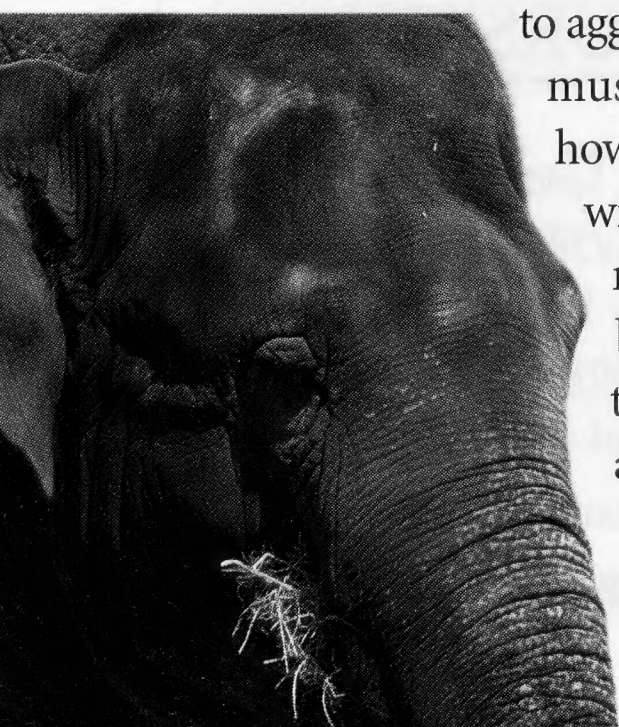
The Zoo's Asian elephant Shanthi is expecting her second calf in December. Her pregnancy appears to be progressing normally, and keepers report they can see bulges when the baby is moving around in Shanthi's uterus. By July, in the sixteenth month of the pregnancy, Shanthi had gained 900 pounds. A newborn elephant weighs from 200 to 300 pounds. The baby was conceived via artificial insemination, the first successful elephant AI at the National Zoo.

At present the Zoo does not have the facilities to hold an adult male elephant. Adult males are bigger and stronger than females, and prone to aggression during their rut, or musth. Plans are underway, however, to build a habitat that will enable a male or several males to live here. This will be part of a major renovation of the Elephant House, along a new Asia Trail.

Mandara, a female lowland gorilla, is also pregnant; her baby is due in November. This will be her fifth baby, although she adopted and raised another youngster as well.

Female giant panda Mei Xiang celebrated her third birthday on July 22, and male Tian Tian celebrated his fourth on August 27. Giant pandas in zoos usually become sexually mature and ready to breed when they are between four and six years of age. Tian Tian showed some sexual interest in Mei Xiang in the spring, but Mei Xiang avoided him. Maybe next year!

JESSIE COHEN/NZP



SHANTHI, THE ZOO'S EXPECTANT ELEPHANT.



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## ANIMAL, M.D.

In addition to the three full-time clinical veterinarians who are charged with the care of the National Zoo's 450 species, veterinarians on our research staff and outside veterinary and human medicine specialists—from veterinary ophthalmologists to human gastroenterologists—are consulted to help tackle the medical challenges of our animal collection.



JESSIE COHEN/NZP

ZOO VETS OPERATE ON IRIS.

Recently, the National Zoo's veterinary team wanted to investigate why Iris, a 14-year-old orang utan (*Pongo pygmaeus*), was regularly

experiencing bouts of abdominal pain and diarrhea. As in human medicine, figuring out why an animal is ill often involves as much trial and error as it does pure medical skill. Several previous general physical exams, including extensive evaluations of her gastro-intestinal tract, showed nothing out of the ordinary. In early May, Stanley Benjamin, the chief of gastroenterology at Georgetown University Hospital (GUH), was called in to lend his expertise. The good news: Benjamin confirmed that Iris's stomach and intestines looked healthy. The bad news: The origins of her discomfort remained unknown.

Another possible explanation for Iris's pain included endometriosis,

a disorder of the reproductive tract. JoGayle Howard, an NZP reproductive physiologist, and Craig Winkel, GUH's head of obstetrics and gynecology who recently made the news for his roll in delivering septuplets, were called in. Iris's reproductive tract checked out fine, but the exploration turned up something unexpected: a discoloration on one small area of her liver. The organ was biopsied, but, as with Iris's other exams, the test results were inconclusive. The clinical veterinary team, along with Lucy Spelman—the Zoo's director and former head veterinarian—are currently working to devise a game plan for further investigation. In the meantime, Iris is recuperating well from her procedures.



ALEX HAWES

## FIESTA MUSICAL

As part of the Smithsonian's Hispanic Heritage Month celebrations, FONZ and the National Zoo each year host Fiesta Musical. The 2001 event is scheduled for Saturday, September 22, and Sunday, September 23, from 11 a.m. to 4 p.m. Fiesta Musical 2001 will feature a variety of family-oriented cultural activities, including a wide range of regional musical and dance performances, traditional handicrafts, and a Latin American food court. There will also be animal demon-

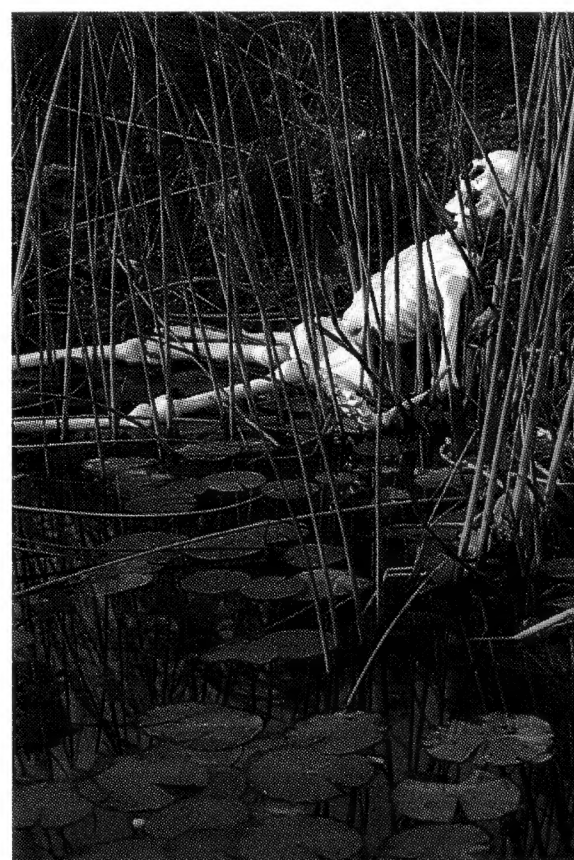
strations narrated in Spanish and in English, and a Spanish-language version of our "Find Out Why?" game for kids. Representatives from the embassies of various Latin American countries, as well as from local community groups and Smithsonian museums and offices, will be on hand to offer information and fun educational activities. Admission is free. Please consider taking Metro or other public transportation, as Zoo parking lots fill early on special-event days.

## BOO AT THE ZOO

This year we're hosting our wildly popular Boo at the Zoo on October 26, 27, and 28, from 5:30 to 8:30 p.m. each evening. The true ghosts, goblins, and witches in children emerge as they travel through the Zoo for Halloween trick-or-treating in animal houses and creep along haunted trails. Children under the age of 12 with an accompanying adult are invited. Everyone must buy tickets in advance. The event has sold out in each of the last three years, so plan on purchasing your tickets early. You can order tickets online via our secure server at [www.fonz.org](http://www.fonz.org), or call 202.673.4613. We encourage you to take Metro or other public transportation to Boo at the Zoo. Parking is limited, so more kids can enjoy fun, safe trick-or-treating if you leave your car at home!

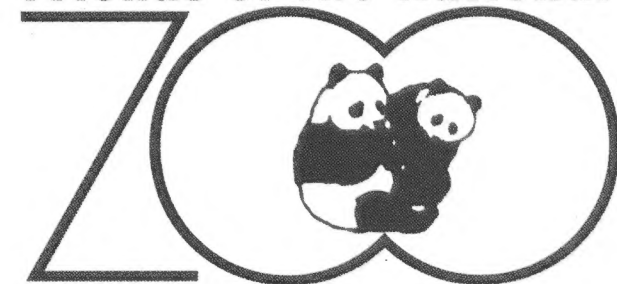
## ZOO TV

Animal Planet is launching seven all-new episodes of its popular TOTAL ZOO series this fall. The backdrop may seem familiar: the National Zoo! Debuting on Tuesday, October 9, from 9 to 10 p.m., the weekly series will expose viewers to the drama of animal care at a major zoo. Episodes will examine how National Zoo staff handle issues ranging from operating on an elephant to handling dangerous reptiles, teaching orang utans language skills, and saying goodbye to three departing tigers.



ALEX HAWES

## Friends of the National



## ANNUAL MEETING

The 43rd Annual Meeting of Friends of the National Zoo occurs Friday, October 5. The event will take place near the new Picnic Pavilion, adjacent to the Mane Restaurant. The reception begins at 6 p.m., when Animal Planet's feature episode about Mei Xiang and Tian Tian's journey to the National Zoo will be played on a giant screen. The film will be followed by the introductions of the new Board members, a speech from Zoo Director Lucy Spelman outlining her ten-year plan, and a screening of Animal Planet's latest feature, "TOTAL ZOO: Anything But Routine."

We cut the ribbon on the new Picnic Pavilion on August 9. This elegant structure offers Zoo visitors shelter from rain and sun, and creates a venue for special events in case of inclement weather. So come check it out during the Annual Meeting, if not sooner!



A black and white photograph of a person's hands holding a bow and arrow in a forest. The hands are positioned on the right side of the frame, holding a bow with a woven grip. An arrow is held taut across the bow, pointing towards the top left corner. The background is a dense forest with many leaves and branches, creating a textured, out-of-focus backdrop. The lighting is dramatic, with strong highlights on the arrow and the hands, and deep shadows in the foliage.

BY JOHN TIDWELL

# Fall of the wild

A VILLAGER IN THE DEMOCRATIC REPUBLIC OF  
CONGO READIES HIS BOW FOR THE HUNT.







# a

group of Baka pygmy hunters stands motionless among a tangle of trees and vines. But instead of carrying bows or long blowguns as their ancestors did, these hunters are armed with rifles.

Already several diana monkeys (*CERCOPITHECUS DIANA*) dangle from one of the men's belts. By the end of the hunt, this group could bring down animals as large as a forest elephant (*LOXODONTA AFRICANA CYCLOTIS*), which could feed a pygmy village for months. But these hunters won't be keeping most of their catch.

Drop into any restaurant in most of central Africa's major cities, and the menu will include some form of "beef." But chances are very great it isn't beef at all. More likely it's a forest antelope known as a duiker (*CEPHALOPHUS* sp.) or perhaps a red forest buffalo (*SYNCERUS CAFFER NANUS*). Head up the Congo River to more remote towns, and the menu often tells it like it is: okapi (*OKAPIA JOHNSTONI*), tree pangolin (*MANIS TRICUSPIS*), crocodile (*CROCODYLUS* sp.)—even chimp (*PAN TROGLODYTES*).



FOREST ELEPHANTS (*LOXODONTA AFRICANA CYCLOTIS*).

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©ANUP SHAH/BBC NATURAL HISTORY UNIT

BUSHMEAT HUNTERS OFTEN TARGET PRIMATES SUCH AS CHIMPANZEES (LEFT) AND MANDRILLS (ABOVE).

In Africa, people have been hunting and eating wild animals—collectively known as “bushmeat”—since the very dawn of humanity. But the scope of the commercial bushmeat trade has expanded so dramatically in the past 30 years that today conservationists are describing it as one of the greatest threats to the natural world. Africa’s wilderness is rapidly being devoured—by foreign companies hungry for its forests and minerals, and by its own desperate people, so ravaged by war and poverty they will do anything to survive. As a result, some of Africa’s most majestic animal species could vanish, leaving once busy forests silent.

The bushmeat crisis raises conservation issues long unresolved in Africa, casting a hard light on cultural and political differences between the Western and developing worlds and adding fuel to the ongoing struggle between corporate ambitions and conservation goals. It is an environmental conundrum with no apparent solution, challenging us to consider whether conservation, as it is currently practiced in Africa and around the globe, is actually succeeding at all.

### **Primates, Guns, and Money**

The constant *chug-chug-chug* of powerful diesel engines echoes through the rainforest. As mist rises off the surging brown water of the Congo River, a motley flotilla of giant riverboats appears. These floating marketplaces, often composed of several huge barges chained together, can take weeks to travel the 800 miles between Kinshasa, the capital of the Democratic Republic of Congo







(DRC), and Kisangani far to the northeast. As the boats come in sight of a settlement, there is a mad scramble of dugout canoes that race out to trade, swarming like fry around a giant fish.

Swiss nature photographer Karl Ammann and his wife Kathy were traveling on one such riverboat in 1988 and were struck by the amount of wildlife being brought onboard from the canoes. The riverboat's marketplace had gone into high gear, and a huge array of African animals—dead and alive—was being traded for luxuries like tin sheeting, galvanized pots, and bottled beer. The meat, fresh and smoked, was purchased, then tagged and packed into massive onboard freezers. By the time the boat reached Kisangani, there were several thousand primate carcasses onboard. What was particularly disturbing was the kind of meat the Ammanns saw: lowland gorilla (*Gorilla gorilla gorilla*), chimp, bonobo (*Pan paniscus*), and mandrill (*Papio sphinx*)—all endangered and supposedly protected species. For Ammann, it was a pivotal moment. Ever since then, he has devoted his life to the issue and has become a provocative leading voice in the outcry against the bushmeat trade.

While people have always eaten wild animals in Africa, the forces of social and economic change are now rewriting the rules of the hunt. Flying over the vast landscape of Cameroon, Gabon, or the Congo, you will pass over nearly 1.5 million square miles of lush green rainforest, roughly the size of France. In the 1960s, this jungle landscape would have stretched to the horizon, an enormous sea of trees. But today one quickly encounters a huge checkerboard of logging concession cuts carved into the forest and connected by a network of brown, muddy roads. Scores of

timber companies from Europe, America, and the Far East have come to West and central Africa in search of rare tropical woods that can fetch up to \$10,000 per trunk on the international market. Welcomed by cash-poor countries wracked with unemployment and civil strife, logging has become a multi-billion-dollar industry, providing the third most important source of national income—after oil and

## The commercial bushmeat trade has expanded so dramatically in the past 30 years that today conservationists are describing it as one of the greatest threats to the natural world.

mining—for West and central African nations.

The Bushmeat Crisis Task Force, a consortium of 28 different conservation organizations focusing on the issue, estimates that nearly 38,000 square miles of rainforest are opened throughout central Africa each year. Stands of rare and valuable sipo (*Entandrophragma utile*) or okume (*Aucomea klaineana*) trees are few and far between, and to get to them loggers have to build roads through virgin, old-growth forest. Despite industry claims, few, if any, timber companies provide food for the migrant workers they bring in. Instead, loggers are quietly given 12-gauge shotguns or are allowed to hire hunters who know the forests, like local Bantu or Pygmies, to bring in fresh bushmeat to feed the hundreds of em-

A WAMBA VILLAGER CUTS UP A FOREST ANTELOPE.



ployees and their families who live on the concessions. This tacit arrangement keeps both employer and employees happy: The workers get the same game meat they often eat in their villages, and the company doesn't have to pay for it.

Hunters usually hitch a ride each morning on company logging trucks as they head out to the cutting sites, promising to bring the driver a monkey or a duiker as

payment. Remote areas of forest that would take weeks to walk into now can be reached by truck in a matter of hours. Hunters shoot anything they can find, though large ungulates and primates are considered the tasti-

est. After a day of hunting, the men butcher and then smoke their kill to preserve it in the 100-degree heat. Their forest camps are often shared with bushmeat traders, as well as foragers filling baskets with fruit, honey, or medicinal plants. Traders buy the meat right there, often paying with 9-ball Chevroline rifle cartridges that can bring down gorillas or elephants with a single blast.

The creation of roads and the introduction of modern firearms to these remote regions of Africa has had a powerful effect on hunting in the rainforest, transforming in a single generation what had been a venerable tradition of subsistence hunting into a kind of get-rich-quick scheme that anyone with a gun can attempt.



By the time the boat reached Kisangani, there were several thousand primate carcasses onboard. What was particularly disturbing was the kind of meat the Ammanns saw: lowland gorilla (*Gorilla gorilla gorilla*), chimp, bonobo (*Pan paniscus*), and mandrill (*Papio sphinx*)—all endangered and supposedly protected species.

“Logging concessions are one of the major motors for the bushmeat trade,” says Richard Carroll, a bushmeat expert for the wildlife monitoring organization TRAFFIC. “Once the forests are opened up, anyone can follow the principal roads into the forest and set up a couple of hundred snares and have a good little business going.”

Carroll reports that the loggers sweep into an area, plucking the choicest hardwoods from the jungle, and then move on to another concession—leaving behind a network of abandoned camps, survey trails, and logging roads. But before the forest can reclaim these areas, a flood of African settlers moves into the newly opened land. They establish permanent farms and villages, use slash-and-burn agriculture, and shoot any wildlife they see. According to Ammann, one European logging company operating in the northern DRC reported 200 people in the concession region when they arrived. Now there are 7,000.

War is another reason large numbers of people head into the forest. According to the World Conservation Union (IUCN), two internationally recognized World Heritage parks are currently battlefields in an ongoing civil war in the DRC (formerly Zaire) that has killed an estimated three million people. Thousands of refugees fleeing soldiers from either side of the conflict are now hiding in the Kaheuzi-Biega and Okapi national parks not far from the fighting. Desperate to survive, the refugees rely heavily on bushmeat, often using semi-automatic weapons obtained

from the various armed forces. The effects on the parks’ wildlife have been devastating. According to the Diane Fossey Gorilla Fund, of an estimated 8,000 lowland gorillas in the region before the war, only about 1,000 still survive. Trade, however, is thriving. Refugees agree to hunt bushmeat for either the government’s forces or the rebels, with the understanding that any elephant tusks go to the military for the ivory trade. The IUCN also reports that both sides in the war are making so much money trading mined gold, diamonds, and coltan (a mineral vital to the production of microchips) to international companies that the conflict may continue indefinitely.

To the west, across the Congo River in the smaller Republic of Congo (RDC), war isn’t raging, but the flow of bushmeat is just as great. Truckloads of dead wild animals are brought out of the forests and sold to middlemen, who send the meat on by truck, rail, boat, or airplane for resale to the restaurants and markets of major cities. Local taboos against the eating of some animals have done little to curb the trade because hunters don’t have to eat what they catch. Bushmeat hunters can make between \$300 and \$1,000 a year, a princely amount for villagers in Africa. According to John Robinson, Director of

governments afloat.

“We estimate that in excess of five million metric tons of bushmeat are coming out of Africa’s forests every year,” says Robinson. “That’s a multi-billion-dollar industry, and there aren’t very many of those in Africa!”

In the sultry heat of late afternoon, open-air markets shimmer with activity in the brawny port city of Libreville on the coast of Gabon. Rich and poor, sophisticated and rustic, people mingle amid the colors, sounds, and smells of commerce. Bushmeat is displayed in quantity: elephant trunks, arms and legs of gorilla, smoked porcupine (*Atherurus africanus*), and a bewildering array of insects and lizards splayed and ready for the stew pot. Karl Ammann reports that bushmeat markets like this one can be found in major cities throughout central Africa. At upscale supermarkets, elephant steaks can go for the equivalent of \$6 a pound, three times the local price of beef. Here bushmeat isn’t a staple; it’s a gourmet food.

In the cities, it’s the well-heeled urbanites who pay top dollar for bushmeat, which fetches ten times the amount the hunter in the forest earned. Urban Africans on average eat the same amount of meat per year that Western peoples do, but

International Conservation at the Wildlife Conservation Society, as foreign companies take most of central Africa’s natural resources out of the country, bushmeat not only feeds the region’s 30 million people but also helps keep local economies and



they prefer bushmeat largely because it is traditional food. For city dwellers, bushmeat is a taste of home, bringing back memories of village life that for many no longer exists. Some wealthy Africans employ bushmeat hunters to bring home dinner the way Westerners hire gardeners. For people in rural areas, bushmeat hunting is considered a supplement to food and income. Conservation International reports that more than half of all men above age 15 in the Ivory Coast identify themselves as hunters, and nearly all are farmers. According to Mohammed Bakarr, Director of the Center for Applied Biodiversity at Conservation International, bushmeat is a cuisine that crosses all social barriers in Africa.

"In our culture, we eat everything," Bakarr says. "Almost 90 percent of anything that moves in West Africa is eaten. That's not only mammals but everything, including invertebrates. For anybody, from the President to the person in the village, bushmeat is seen as a delicacy."

Traditional healers use large numbers of animal skulls, bones, skin, and feet for folk medicine. Gorilla meat is believed to make one strong and powerful. Bushmeat has powerful social significance as well. In rural Cameroon, to present a guest with the hand of a gorilla is a sign of esteem. Furthermore, the pervasive credo, *The forest will always provide*, dovetails with the still predominant Christian theology of central Africa: *God has made the animals for man to use, and He alone can make them come or go away.*



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FRANS LANTING



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FROM TOP: THE HAUNTING STARES OF MANDRILL, BONOBO, AND GORILLA.

### The Silence of the Woods

There are no hard facts on either the bushmeat trade or the animals it affects. Those who participate in the trade don't keep records, and few conservationists have had either the ability or

inclination to venture into the dangerous regions of central Africa where the bushmeat trade is most pervasive. Information tends to filter in from the field, based on isolated surveys, anecdotes, and the private investigations of independent crusaders like Karl Ammann. According to the Bushmeat Crisis Task Force, hundreds of animal species in the region face the threat of extinction in as little as ten years. Primates and other animals that reproduce slowly and have only a few young are among those in the greatest danger.

Last year, scientists reported that populations of Miss Waldron's red colobus monkey (*Procolobus badius waldroni*) had dipped so precipitously that the once plentiful primate was believed extinct [see "BioAlmanac," November/December 2000 *ZooGoer*]. Wild populations of chimpanzees once numbered in the millions throughout the Congo region, but today it is estimated that no more than 150,000 remain. Apart from people killing them, many are captured for sale as pets. The lucky ones are delivered to Africa's few primate orphanages, though most of these are now full.

Populations of lowland gorillas and bonobos have also been severely affected, not only from poaching but also from habitat fragmentation caused by logging. Primatologist and bushmeat activist Jane Goodall has said that human encroachment and exploitation of Africa's wilderness is like a devouring wave that sweeps through and creates what conservationists call an "Empty Forest."





WILD BONOBO POPULATIONS TODAY ARE RESTRICTED TO THE WAR-TORN DEMOCRATIC REPUBLIC OF CONGO.

FRANS LANTING

"It's catastrophic because it's not sustainable," Goodall said in testimony before the U.S. Congress last year. "Which means that not only will the forests lose all their animals, but that those that used to disperse seeds will no longer be there." In other words, if these animals disappear, the forest cannot regenerate.

John Robinson of the Wildlife Conservation Society says that the alarm calls over overhunting and empty forests are not environmental over-reactions, citing the example of what happened in the great jungles of Asia a few decades ago. In the 1970s, conservationists were not organized or experienced enough to realize what was happening when Malaysian, Chinese, and Japanese logging companies began large-scale opening of forests in Southeast Asia. Widespread bushmeat hunting followed, and in 30 years the wildernesses of Thailand, Malaysia, Vietnam, and Indonesia have fallen eerily quiet.

A United Nations report released this year stated that in Asia growing numbers of cities, land degradation, and widespread neglect of environmental protection measures are leading to an ecological disaster that could cost some \$10 trillion to clean up over the next 30 years. Robinson says the encroachment wave has already swept through Asia and is now cresting on the forests of Africa. If nothing is done, it will consume Africa's wildlife, as well as its precious timber and mineral resources.

### Endgames

Great apes are protected by the Convention on International Trade in Endangered Species (CITES) and by many of the African governments

that are signatory to that treaty. But in the bushmeat markets of West and central Africa, you would never know it. War, social upheaval, and a general collapse of many African economies and infrastructures have created a world of might-makes-right and institutional

Omar Bongo listing animals desired for a state dinner. "That meant if they wanted river hawk or elephant or buffalo meat, he would have to go shoot it and deliver it to the palace," explains Ammann. "If he didn't do it, the army generals would use it as an excuse to come in with helicopters and shoot anything in sight."

As conservationists admit, many Africans are very serious about conserving the environment, and almost every African government has a Forests and Wildlife Department. But converting Western ideas about conservation into working programs in African villages has been neither easy nor always fruitful. Often something is lost in the translation—with misunderstandings on both sides. Karl Ammann tells the

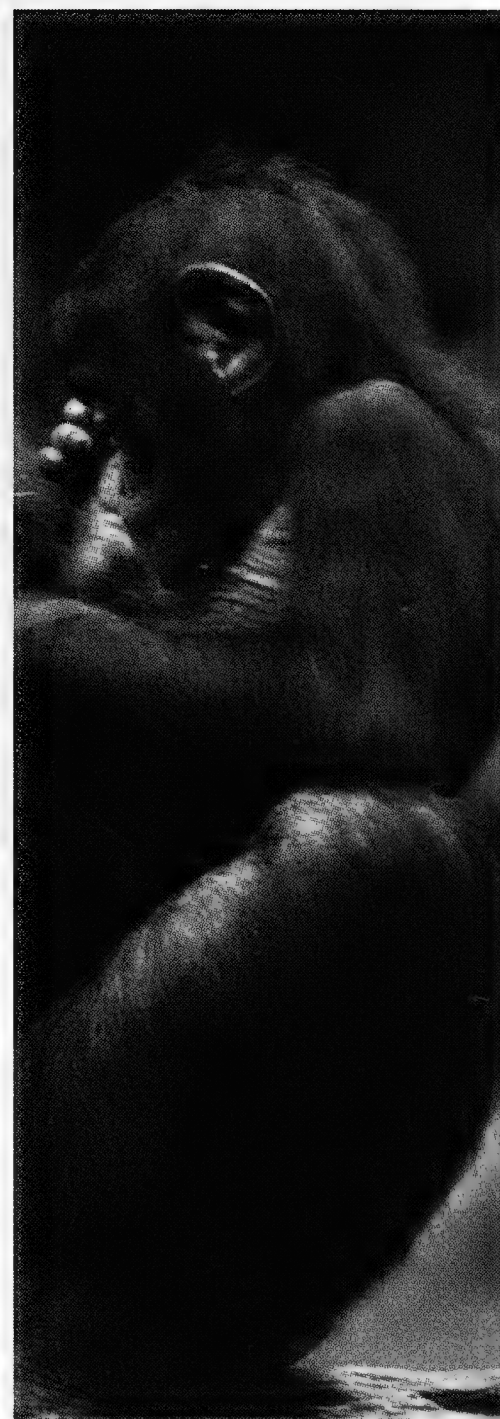
story of a gorilla habituation program he encountered in southeastern Cameroon that was trying to sensitize villagers to primate conservation issues with T-shirts bearing the slogan: *Worth more alive than dead*. "I met the Chief of Police wearing one of those T-shirts, and he tried to sell us some chimps," Ammann recalls. "So his interpretation of 'worth more alive than dead' seemed to be selling a live chimp."

Similarly, one solution to the bushmeat crisis proposed by Western conservationists has been to encourage Africans to eat domesticated beef, pork, or chicken rather than forest animals. According to George B. N. Ayittey, a Ghanaian professor of Economics at American

"In our culture, we eat everything," Bakarr says. "Almost 90 percent of anything that moves in West Africa is eaten."

corruption. A familiar refrain in the DRC is that it's a rich country of poor people. Everything in this French-speaking country works *en principe* (which often means not at all), and nothing works without the omnipresent bribery that locals call *matabeesh*. Logging companies from Malaysia and China bring large gifts of cash or goods to African leaders in exchange for prime timber concessions, some of which are located inside national parks.

According to Ammann, poaching for bushmeat in these protected areas is rampant. One game warden he spoke with in Gabon's Wonga Wongue reserve reported that he would receive faxes from the office of President



FRANS LANTING



A TREE PANGOLIN (*MANIS TRICUSPIS*), ONE MORE SPECIES ON THE BUSHMEAT MENU.



University and author of the book *Africa in Chaos*, the effort has largely failed because such animals are expensive to raise in a tropical rainforest. Most African villagers tend to use domestic animals as Westerners use expensive wines: something for a special occasion. Bushmeat, on the other hand, is free for the taking. Ayithey says when conservationists encourage Africans to rely on cows, it's like being told, "Let them eat cake."

"Westerners have their own notions of appropriate sources of protein," Ayithey says, "and they go to Africa and think, 'Well, if Americans eat hamburgers, then the villagers in Africa should also eat beef or go to McDonald's.'"

Every year the largest Western conservation organizations navigate well-established channels of influence and funding, creating proposals, holding planning meetings, and negotiating with armies of African ministers, all to create a political and economic framework upon which to hang workable programs. Since bushmeat became a recognized conservation issue in the late 1990s, many studies and plans have been devised in the U.S., in Europe, and in Africa focusing on the problem. Agreements have been made with timber companies to ban bushmeat and rifles from concessions. African governments in Gabon, the Central African Republic, and Cameroon have

agreed to enlarge protected areas and prevent illegal logging and poaching there. (Ironically, the most successful example of logging prevention in the region has been the war in the DRC.) Commercial bushmeat hunting, especially with the use of wire snares and powerful rifles, is strictly regulated in most West and central African nations, with jail time for poaching. But while these agreements seem like progress *en principe*, some experts are growing concerned that much of conservation's sound and fury does not translate into results in the forest.

"It's very hard to get anything to happen on the ground," says John Terborgh, professor of environmental science and biology at Duke University. "African governments can make all sorts of agreements, but since they have no capacity to implement them, these agreements exist largely on paper."

Terborgh says that in many African countries laws in general have more to do with maintaining power than actual justice as it is understood in the West. Politics and conservation issues become one and the same, and as such are governed more by *matabeesh* than the needs of wildlife. Western conservation organizations working in the field feel compelled to present upbeat reports to se-

cure more funding and are reluctant to criticize African governments for fear they will be banished from these countries. Ultimately, Ammann says, stopping something like the bushmeat trade comes down to the personal agendas of African politicians.

"If you can get the Minister of Wildlife or the President to listen to you, then maybe you can create some political will," he says sadly. "But right now, as long as the minister wants to see bushmeat on his banquet table, a CITES official isn't going to say 'Minister this has to stop!'"

Can African wildlife be saved before it's too late? Everyone in the conservation business has a plan. Some offer ecotourism, others tout better enforcement of laws and protected areas. Community-based programs emphasize action by African villagers in their local area. John Robinson says the real issue is not whether a solution can be found, but whether it can be found *in time*. The time is now. *Z*

—John Tidwell, a freelance writer and independent television producer, last wrote about Caspian sturgeon in the May/June 2001 ZooGoer.











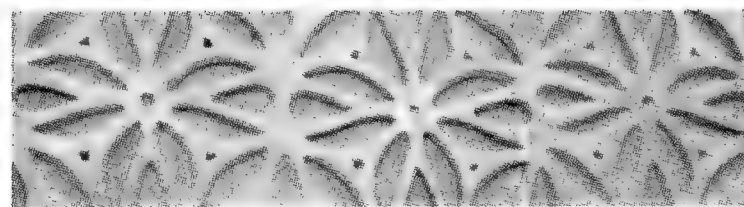
# España Verde

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## Spain's Living Landscape







BY HOWARD YOUTH

For centuries a thriving, fought-over outpost, the central Spanish city of Segovia is now a popular tourism destination. “No city in Spain presents such a dramatic appearance....” says the Fielding’s guide to Spain of Segovia, and gives it a five-star rating. By all accounts, wild birds can’t read, but Segovia is also a prime stop for many of them.

Originally a Celtic town, Segovia fell to Roman conquest in 80 B.C.E. The Moors settled there about 700 years later but were ousted by the Christians in 1085. These successive societies built houses of worship, forts, administrative buildings, homes, and other structures. Their handiwork left much to inspire the historian or tourist, but birds prize Segovia’s architecture for a different reason—it provides top-notch nest sites.

A naturalist visiting Segovia sees the town a bit differently than the typical visitor. First stop: the 163-arch aqueduct, a 2,000-year-old remnant of Roman ingenuity built of massive, mortar-less granite blocks. Here, thousands of common swifts (*Apus apus*) and a handful of thrushes called black redstarts (*Phoenicurus ochruros*) nest.

Next stop, the huge 23-chapel Segovia Cathedral, built in the 16th century. This “Lady of All Cathedrals” could also be considered one of the world’s largest and most costly birdhouses: Its extensive roofwork attracts cavity-nesting birds such as sickle-billed crows called choughs (*Pyrrhocorax pyrrhocorax*), rock (*Petronia petronia*) and house sparrows (*Passer domesticus*), spotless starlings (*Sturnus unicolor*), rock doves (*Columba livia*), and small, gray-headed crows called jackdaws (*Corvus monedula*). This palatable guest list draws a local peregrine falcon (*Falco peregrinus*) or two, while the peregrine’s smaller, more colorful cousin, the lesser kestrel (*Falco naumanni*), nests on nearby rooftops.





GABRIEL SIERRA GONZÁLEZ



VIDA RUSSELL

## Birds prize Segovia's architecture for a different reason—it provides top-notch nest sites.

LEFT: BUZZARD (*BUTEO BUTEO*). RIGHT: SEGOVIA'S ALCÁZAR CASTLE.

And a few minute's walk away, tight, winding streets yield to the Alcázar. This fairytale fortress was embellished by centuries of rulers and is where Isabella of Castille (of Ferdinand and Isabella fame) was named queen. Today, it is home to nesting and roosting white storks (*Ciconia ciconia*) and dozens of ash-colored swallows called crag martins (*Ptyonoprogne rupestris*).

Segovia's wildlife appeal is not unusual for Spain, where cultural history often meets natural history in seemingly timeless tranquility. Well-known for its unique customs and delicious food, Spain is also beloved by naturalists as a hotspot for European wildlife. The Spanish countryside is littered with historic towns and ruins riddled with home possibilities for birds. Its small cities and towns shelter nesting birds that reverse-commute, feeding on the bounty of the surrounding, mostly cultivated countryside, where many other species remain full time to breed and feed.



### Spain's Natural Bounty

"Last bastion" is a term often used to describe Spain's importance as a haven for Europe's declining birds, and for good reason. Spain has the most intact and varied avifauna of any Western European country. The *EBCC Atlas of European Breeding Birds*, an international effort to chart European bird species' breeding abundance and distribution, reports that Spain holds the largest nesting populations of 99 species—about one-fifth of Europe's bird species. In many cases, other European countries' totals of these species don't

come a close second or third. For some species, Spain is the only European outpost, with the rest of their range lying across the Strait of Gibraltar in Africa. All told, about 70 percent of Europe's 495 bird species either visit or breed in Spain. The case is similar for the country's 82 mammal and 53 reptile species [see "Wildlife on the Rocks—and Buildings," page 28].

History, climate, building trends, size, and population seem to all play a part in explaining why Spain remains full of rugged, rural landscapes that entice birds. "The Spanish people, rich and poor, congregate in town or village, and vast stretches of the 'campo,' as they call it, are thus left uninhabited, *despoblados*—relinquished to natural conditions...." wrote British hunters and adventurers Abel Chapman and Walter J. Buck in their 1893 book *Wild Spain: Sport with Rifle, Rod, and Gun, Natural History, and Exploration*. Today, although Chapman and Buck's vision of a "...country so largely abandoned to nature...untouched by man, untamed and glorious in pristine savagery...." has changed, the visitor still gets their sense of "the splendid abandonment of rural Spain."

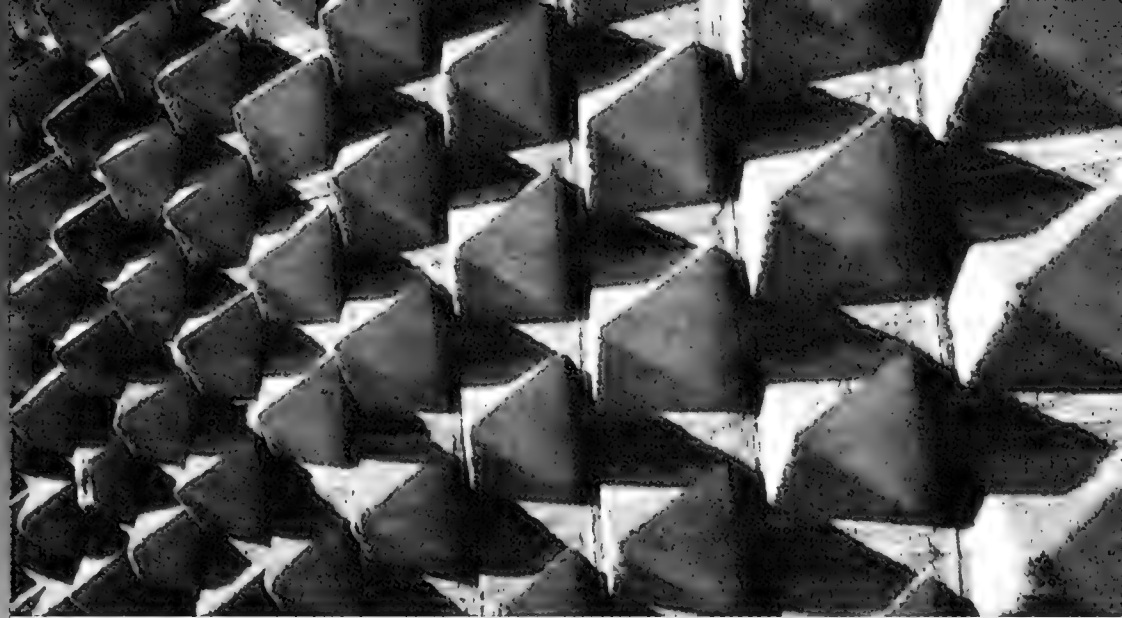
Spain's economy lagged from the Spanish Civil War in the mid-1930s through much of the rule of dictator Francisco Franco, who died in 1975. During that time the strongly agrarian economy sustained itself on traditional agriculture, which slowly advanced over the decades. Today, the country's economy is dynamic and booming. Farms are increasingly efficient and modernized, and irrigation is spreading.

In many areas, it is still true that the Spanish live in tightly packed towns and cities. Outside of the big cities, Spain's countryside remains largely agricultural. Centuries of farming swept away most of the country's original low-elevation forest and grasslands. The rural scenery is now a continuous patchwork of crop fields, orchards, vineyards, and pastures stitched together by hedges, wooded streams, cliffs, and other ribbons of wild habitat. Much of the country is high plateau laced with even higher mountains, which hold rich forests that provide countless tucked-away wildlife enclaves. Despite widespread habitat alterations, there remains enough of wild Spain to keep naturalists busy for many lifetimes.

However, especially around high-priced and growing cities such as Madrid, suburbs now spill far out into the countryside as they do in the United States. There is also a burgeoning market for second homes, many built in the mountains just outside Madrid. This trend will likely continue if the Spanish economy continues its current boom.

Marginal soils, a dry climate, and decades of economic hard times contributed to Spain's abundance of open, rugged land. However, another factor plays strongly: Spain is not over-populated like other European countries, but is jumbo-sized by European standards. Slightly larger than France—a bit more than twice the size of Oregon—it supports a stable population of about 40 million people. By contrast, France, Italy, and the United Kingdom—which is about half the size of Spain—each have almost 60 million.





ABOVE: ARCHITECTURAL DETAIL ON BUILDING IN SEGOVIA.

GABRIEL SIERRA GONZÁLEZ

VIDA RUSSELL

LEFT: EUROPEAN BEE-EATER (*MEROPS APIASTER*).  
BELOW: AN AQUEDUCT IN SEGOVIA.

VIDA RUSSELL



Germany is also smaller but is home to about 80 million people.



### Look What the Stork Dragged In

In Segovia and many towns throughout central and southern Spain, no one can ignore perhaps the largest backyard birds in the world: white storks. With six-foot, black-and-white wingspreads and candy-red legs and dagger bills, few birds seem as impressive, and at times as awkward, while perched on a rooftop. Over the centuries white storks adopted human towns as nesting habitats, as long as prime feeding areas—pastures, wetlands, or fallow fields—lay nearby. Although people valued them as good luck symbols in Spain and legendary baby-deliverers in Germany and other countries to the north, the birds seem too busy raising their own young to concern themselves with human affairs. They

cram food into their chicks' bills high above the fray, in bulky stick nests stacked and woven atop terra-cotta rooftops and towers.

Wetland drainage and modernized agriculture, as well as drought in their African wintering grounds, changed the storks' prospects, causing sharp declines across Western Europe in the 20th century up through the 1980s. They vanished from some countries, such as Denmark, Sweden, Switzerland, and Italy, where some now occur only thanks to costly reintroduction programs. In Western Europe, Spain held—and still holds—by far the largest population at more than 16,000 breeding pairs. Traditionally, Spain has been a stork stronghold for the same reasons that many other birds remain far more common there than elsewhere: First, marginal soils often require Spanish farmers to alternate their fields, leaving some to go fallow. Open pastures are another common landscape in these areas. Pastures and

fallow fields abound in insects such as grasshoppers and beetles, which are important stork foods, and other prey, such as lizards, snakes, and, near rivers, fish and frogs. Also, the region's dry, warm weather nurtures young storks, although cold, wet snaps can cause high mortality, especially if they hit just after chicks have hatched.

These days, after a decades-long decline, white storks seem to be recovering in many parts of their range. Many scientists believe that recent wet winters on the birds' African wintering grounds are responsible. Spain, however, plays an important role. Set along white storks' western migratory path (Turkey provides the key continental link east of the Mediterranean), Spain is important to storks that nest farther north and pass by there on their way north or south to Africa. Increasingly, fewer storks make the entire journey. Instead, 3,000 or more white storks spend the winter in Spain.





ABOVE: LESSER KESTREL (*FALCO NAUMANNI*).

Part of the switch in wintering habits may stem from climate change, which scientists also speculate may explain other changes in Spanish bird behavior, such as why barn swallows (*Hirundo rustica*) now arrive there from African winter quarters about a month earlier than they did 30 or 40 years ago. But trash also likely provides part of the enticement. Large dumps in the south and center of Spain provide a stinky smor-

gasbord not only for locally nesting storks but also those that migrate there from Germany, the Netherlands, France, and other countries.

Eating trash does not seem to harm the storks but rather broadens their feeding horizons. Just outside Madrid, at Spain's center, storks can now be found at the dump year-round. "What we have seen is that they mainly feed their young natural foods around here," says Jose Aguirre, a biologist



VIDA RUSHL

STONWORK IN SEGOVIA.



RED-LEGGED PARTRIDGE (*ALECTORIS RUFA*).



RIGHT: THE ALCÁZAR.  
FAR RIGHT: GREAT BUSTARDS (*OTIS TARDA*).



VIDA RUSSELL

GABRIEL SIERRA GONZÁLEZ

“Last bastion” is a term often used to describe Spain’s importance as a haven for Europe’s declining birds, and for good reason.



who studies white stork nestling survival. “What they keep for themselves is food from rubbish dumps.” Around Madrid, nestlings seem to eat mainly insects, with a few frogs, snakes, or lizards. Aguirre and his colleagues discovered this by examining the pellets that young and adult birds regurgitate daily.

Seeking clear transmissions, radio, television, and telephone companies have been busy erecting towers across Europe. Storks, seeking clear sight lines and good nest supports, flock to these structures. Just outside Madrid, for example, several dozen pairs nest on the National Radio transmission towers, including one so high that the storks and their nest are nearly invisible to the naked eye. “That is probably the highest stork nest in Europe,” notes Aguirre as we drive past the fenced-off tower field.

Also, electric power line towers march across the landscape like seemingly endless, giant clotheslines. The lines prove a deadly obstacle to many storks, as well as to other birds such as bustards, cranes, and lapwings. These large birds collide with cables when dropping down to earth for a landing. In many cases, younger birds appear to be more vulnerable. The wires often blend

with the landscape when seen from above, so the birds fly right into them. Storks and other birds are also electrocuted when they touch the lines. Electric companies began installing colored disks that reveal the wires to incoming birds. Where present, these markers apparently reduce bird mortality.

Although a menace for some birds, the growing electric power tower network also provides important nesting sites for other species. Across Spain’s countryside, and in many other European countries, white storks are increasingly nesting on these elevated, out-of-town towers, as are ravens (*Corvus corax*), magpies (*Pica pica*), and some other birds.

Wherever white storks nest in Spain, other opportunists follow. For example, one day while birding just outside of Madrid, a friend and I spotted a large, lumpy stork nest, perhaps six feet tall and made of sticks stuffed into the frame of a rusted old radio tower. One stork—probably the female, which spends more time at the nest—was incubating her eggs atop the nest, while a jackdaw, house sparrows, and four monk parakeets (*Myiopsitta monachus*)—South American parrots introduced and expanding around

Madrid—prospected for nest sites in the dangling mass below.

The past 15 years have brought significant changes to some Spanish farmlands. Irrigation, supported in part by European Union funds, is spreading, as are larger, more mechanized farms where hedgerows and other wild features are carved away in order to maximize yield. Extensive fields of sunflower, for example, do not provide the varied plant and insect life that many open-area birds need to survive and feed their young.

Europe’s heaviest flying birds, turkey-sized great bustards (*Otis tarda*), are another potential loser if Spain’s agriculture changes dramatically. These striking cinnamon, gray, and white creatures, which can weigh up to 33 pounds, benefited from widespread deforestation centuries ago, inhabiting grasslands and fallow fields that sprung up after dry-area oak woods fell in central and southern Spain. Today, Spain’s great bustard population—at about 17,000 birds—is the healthiest in Europe. Their habitat consists no longer of grassland, but rather cereal and fallow fields. A strong population persists just outside of Madrid, although spreading development threatens it. This bird’s smaller cousin, the little



bustard (*Tetrax tetrax*), also abounds in Spain, with more than 200,000 pairs.

The treeless landscape perpetuated by cereal fields is critical for many predatory birds as well, including the sleek lesser kestrel. While the news for Spanish wildlife living in Spain's inhabited rural landscapes is generally good, the story of this small falcon is a marked exception. In the early 1960s, more than 100,000 pairs nested in Spain. Today, between 5,000 and 8,000 pairs—by far the most remaining in Europe—live there. These sweet-potato-orange, buff, and gray falcons nest in small colonies in church steeples, castles, and other high buildings, fanning out at dawn to hunt insects in surrounding farm fields. Still a familiar sight in and around Seville, where they nest near and circle the famous mosque-turned-church called the Giralda—the lesser kestrel's fortunes are further hurt when old buildings are fixed up. In recent years, many more churches are being restored, perhaps due to the country's growing affluence. Lesser kestrels are disappearing especially fast in areas outside Madrid, where houses and roads replace their feeding areas.



### Wine Stoppers for Wildlife

Extremadura, Spain's southwest province, is the world's second largest cork producer after Portugal. Native cork oaks grow amid rough pastures, their famed bark periodically stripped to stopper Europe's wine bottles. But the province is known not only for its cork, but also its pork. *Pata negra* (black foot) ham is a regional specialty

famed for its flavor, enriched from the cork oak acorns that dark Extremaduran pigs snuffle up beneath the gnarled, small-leaved trees. In this extensive habitat, a good portion of Europe's common crane (*Grus grus*) population winters, also eating the acorns. During spring and summer, when cranes are on Scandinavian nesting grounds, turtle doves (*Streptopelia turtur*), woodchat shrikes (*Lanius senator*), booted eagles (*Hieraaetus pennatus*), and black kites (*Milvus migrans*) nest there.

The growing trend for wine-makers to use plastic stoppers, however, concerns cork growers and environmentalists alike. If plastic stoppers, currently used in bottling a small but growing percentage of European wines, prevail in years to come, the cork market might take a nosedive, forcing cork oak acreage to decline as growers plant different crops.

Another famed product of Spain, the olive, covers far more area but provides poorer digs for wildlife. Spain, along with Italy, Greece, and Tunisia, is one of the world's top olive producers. In large groves spanning the drier parts of the country, rural creatures live, including a good part of the continent's largest population of little owls (*Athene noctua*), diurnal insect-eaters that often seek shelter and nest in olive trees and nearby stone structures. Large groves, however, are monocultures catering to only a relatively few species. Small groves near other habitats, such as open fallow fields, sustain more biodiversity.

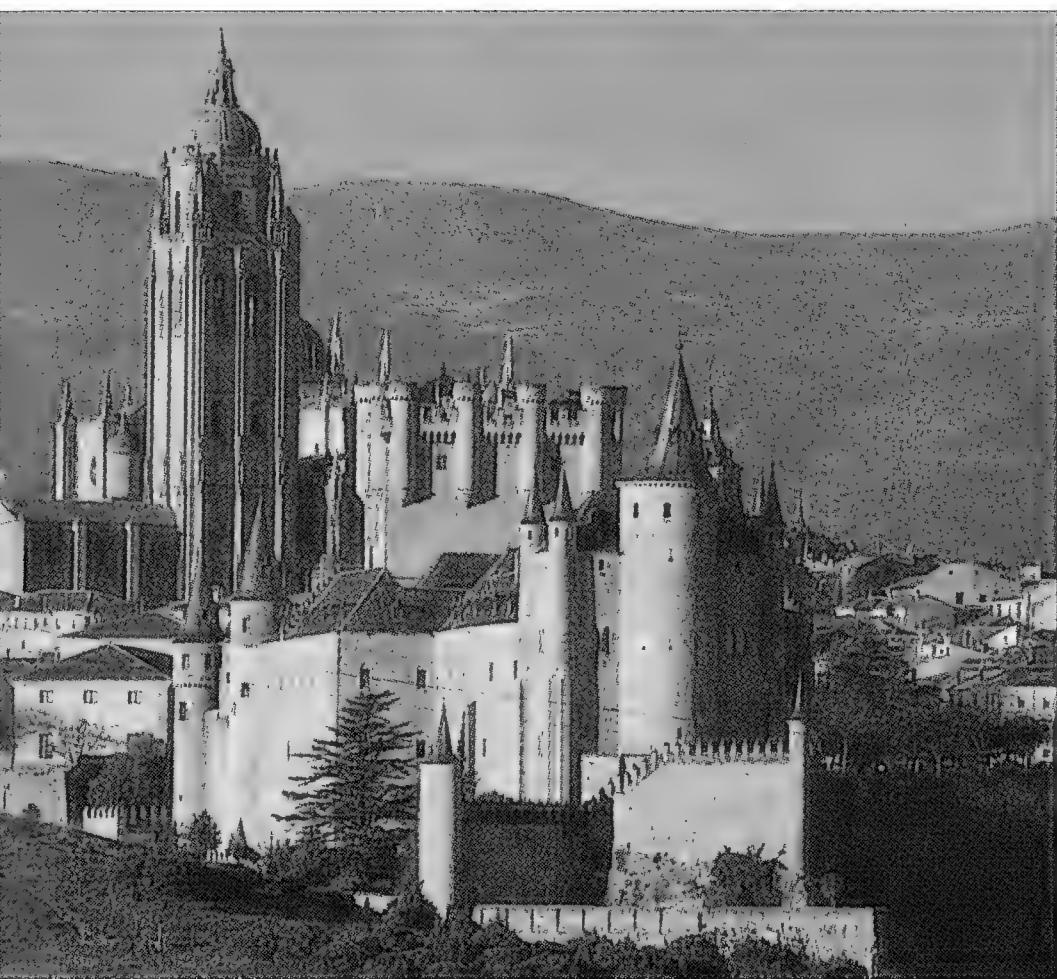
Perhaps no other bird concerns hungry Spaniards more than another rural denizen, the red-legged partridge (*Alectoris rufa*). During the



LEFT: WHITE STORKS (*CICONIA CICONIA*).

SEGOVIA CATHEDRAL.





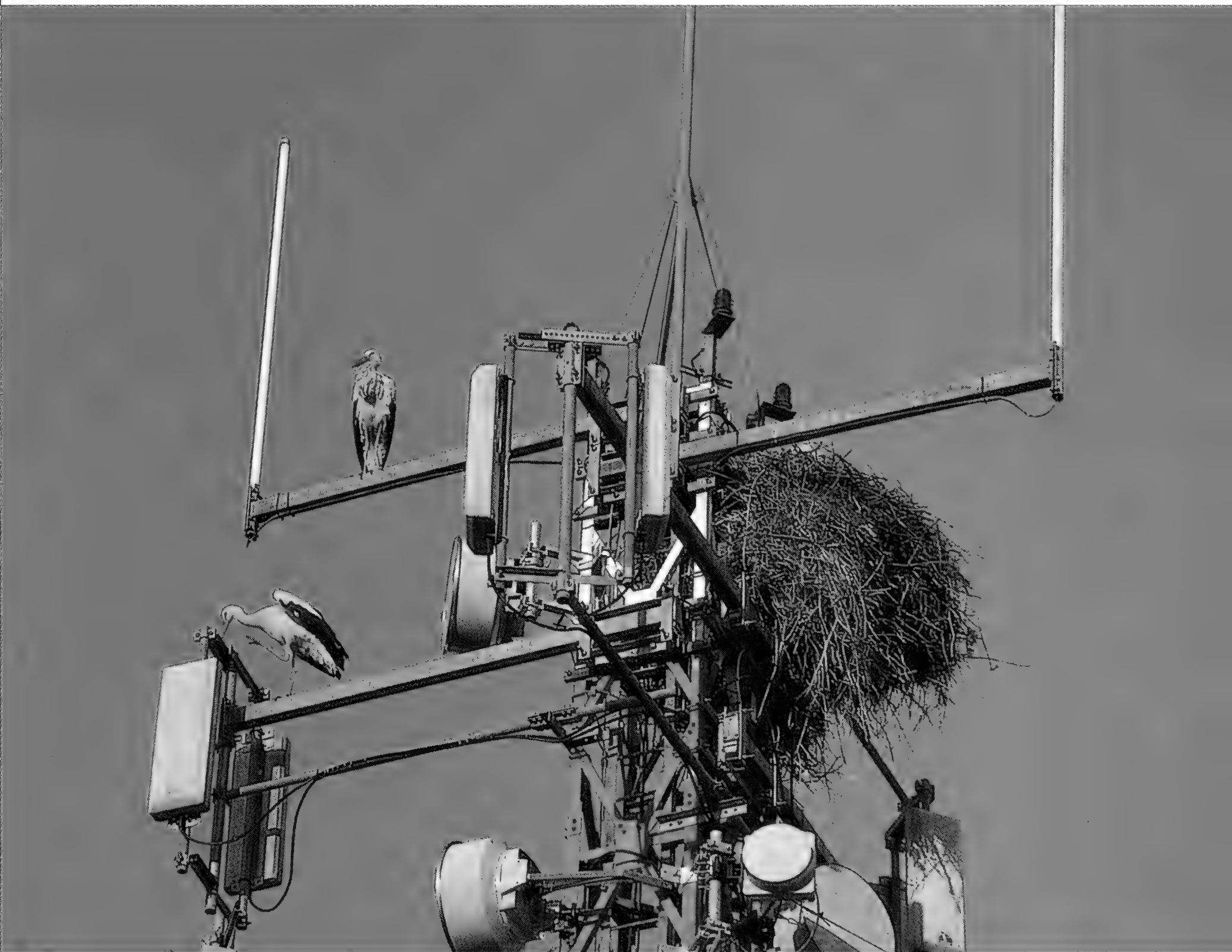
GABRIEL SIERRA GONZÁLEZ

fall hunting season, this plump gamebird, called *perdiz* in Spanish, is familiar fare in restaurants nationwide. Despite widespread hunting pressure and declines in other Mediterranean countries, red-legged partridges remain common in a wide variety of Spanish agricultural landscapes, from open fields to olive groves. This bird's future did not seem too bright to Abel and Buck, who, clearly perturbed, wrote in 1910: "The red-leg—under the murderous system of shooting, year in and year out, over decoy-birds—would be exterminated within three or four years in any other country save this. It is merely the incredible fecundity of the bird and the vast area of waste lands that preserves the breed." One modern problem is that farmed partridges are often introduced, making the wild population appear far more abundant than it is. Introductions also muddle the gene pool because farmed partridges sometimes have mixed lineage, being hybrids that are part non-native chukar (*Alectoris chukar*) or rock partridge (*Alectoris graeca*).

It may be premature to say that Spain will always remain a haven for birds failing in other

Lesser kestrels are disappearing especially fast in areas outside Madrid, where houses and roads replace their feeding areas.

MARTA YOUTH



GABRIEL SIERRA GONZÁLEZ



European countries. While public and governmental concern for wildlife issues is growing in Spain, economic growth and enterprise are often more highly prized, bringing with them formidable environmental changes. Yet for long-term survival, species like the great bustard or lesser kestrel have no better stronghold than Spain. The future may yet be bright for these birds. Standing on the Alcázar's fortified walls, looking over a seemingly endless patchwork of farms, river bends, and woodlots, one feels a calming timelessness. A black vulture, Europe's largest raptor, soars past, and the clapping of

stork bills fills the air. From this vantage point, and countless others across Spain, it is easy to believe there will always be a lot of wild in Spain's not-so-wild landscapes. Z

—Howard Youth, a Contributing Editor to ZooGoer, is living in Madrid while he explores European nature.

RIGHT: WHITE STORKS OFTEN PERCH HIGH ON ANTENNAE IN MADRID. ABOVE: LITTLE OWL (*ATHENE NOCTUA*).





GABRIEL SIERRA GONZALEZ

BUZZARD (*BUTEO BUTEO*).

Spain's stony landscape lends itself to stacking. Over the years, farmers have tilled the lumpy soils, piling up retrieved stones to form boundary fences. These stone fences and old stone walls provide important living spaces for small animals. For example, garden dormice (*Eliomys quercinus*) live in such rocky places, sharing crevices with a wide variety of lizards and snakes.

The dormice and other rodents attract open-area predators including common buzzards (*Buteo buteo*), barn owls (*Tyto alba*), red foxes (*Vulpes vulpes*), and common weasels (*Mustela nivalis*)—diminutive hunters shorter than chipmunks that seek the same rocky shelters that their prey do. Stone martens (*Martes foina*), larger weasel relatives more than two feet long, make their homes where abundant cavities occur in walls, or house attics, or trees. They also sometimes den in crawl spaces and other suburban hideaways.

Less likely to shelter in houses, the common genet (*Genetta genetta*), a night-stalking, house-cat-sized carnivore, is nonetheless one of the most common predators in southern olive groves and other agricultural lands. This seldom-seen animal may have found its way to Spain via Moorish colonizers, who brought the animals from Africa and domesticated them to control household rats.

Twenty-five bat species inhabit mainland Spain. Many roost and breed in human-made structures, from mines to wall cracks. For example, Savì's pipistrelle (*Pipistrellus savii*) dwells in many of the same places as the creag martin; in fact, the bat and bird have almost identical ranges in Europe. In Spain, they primarily nest or roost in crevices in walls and cliffs. Other bats are more common in towns—even in large cities. Common and Kuhl's pipistrelles (*Pipistrellus pipistrellus* and *kuhlii*) roost mainly in buildings, in holes in old walls or other cavities, and in abandoned rooms and attics.

Reptiles find sunny Spain to their liking, especially thanks to dry conditions and plenty of hiding spaces. Two widespread gecko species, for example, frequent rock walls and

houses in both town and country. The Turkish gecko (*Hemidactylus turcicus*) is more of a Mediterranean fixture, living in low, warm areas, usually close to the seacoast. The Moorish gecko (*Tarentola mauritanica*) enjoys a far wider range, penetrating the interior and reaching middle altitudes, such as the suburbs of Madrid. These insect hunters frequent bug-attracting lights and are a familiar summer sight.

In Spain and the rest of Europe, by far the most diversified lizard family is the Lacertidae. Mainland Spain is home to 16 species, some localized, others widespread. (Seven more live on Spain's Canary Islands.) The largest is the ocellated lizard (*Lucerta lepida*). This blue-spotted green-skinned reptile grows to 20 inches or longer, living in a variety of habitats throughout Spain, from sea level to 6,000 feet. Highway margins, olive groves, and vineyards fit the bill in many warm areas, where stone walls, rock piles, rabbit holes, and shrubs provide cover for these hunters. The lizards themselves are hunted by hawks, eagles, foxes, and other predators. Ocellated lizards eat mainly insects, but also may consume other lizards (including geckos), as well as baby rabbits and other small mammals, birds' eggs, and fruit. Spain has its share of snakes, too. Some, such as the smooth snake (*Coronella austriaca*), find stone walls to be ideal habitat.

In most areas a seasonally dry country, Spain nonetheless has 25 amphibian species, some of which live in cultivated areas. Many inhabit moist northern Spain, where the climate is most like that of France. A few, able to capitalize on whatever minimal moisture is available, are found countrywide. One prime example is the parsley frog (*Pelodytes punctatus*), which breeds in flooded ditches. During the day, resting parsley frogs retreat under stones or nestle among weeds at the base of walls. Natterjack toads (*Bufo calamita*) and common toads (*Bufo bufo*) breed in varied habitats, with males and females massing and mating in flooded pastures, abandoned quarries, and temporary pools, including those produced by tires on muddy roads.

BY HOWARD YOUTH



# BOOKS, NATURALLY

***The Ghosts of Evolution: Nonsensical Fruit, Missing Partners, and Other Ecological Anachronisms.* Connie Barlow. 2000. Basic Books, New York. 291 pp., hardbound. \$26.**

My husband and I grow grapes in our urban garden, just enough so that a few times each summer I have the pleasure of announcing desert to our dinner guests with a casual, "John, will you harvest some grapes to serve with the coffee?" We'd have more grapes, however, if we weren't in fierce competition for each ripe orb. All day, cardinals, catbirds, mockingbirds, blue jays, and starlings stop by to pluck the fruits; all night, a raccoon chows down. This underscores a simple fact: Ripe fruit is meant to be eaten. Tasty, nutritious fruit is the reward many plants bestow on the animals that disperse their seeds.

So when tropical ecologist Dan Janzen noticed that the forest floor in his Costa Rican field station was littered with large, uneaten fruits, he wondered why. Why would plants waste their energy producing big fruits that nobody eats? Ah, but somebody did sometimes eat them. Set loose in the forest, domestic cattle scarfed them up, although clearly these New World plants hadn't evolved fruits for Old World cows to eat. In a flash, Janzen had an idea—and a likely solution to the mystery. The animals these fruits evolved to entice are extinct. Paleontologist Paul Martin assembled a list of suspects: species like the mastodont elephants and giant

ground sloths that once grazed in these forests but disappeared at the end of the Pleistocene about 13,000 years ago.

Janzen and Martin outlined their hypothesis in a paper published in the prestigious journal *Science* in 1982. Although not without controversy, the article launched a new line of inquiry in ecology and evolutionary biology that has explored dozens of "evolutionary anachronisms." Or, as science writer Connie Barlow calls them in her new book, "ghosts of evolution." Barlow tells wonderful stories as she reviews the scientific literature of this burgeoning field.

It turns out there are many anachronistic fruits. "Grocery stores are excellent places to encounter ghosts," Barlow writes, as are city streets and parking lots. Papayas, avocados, and ginkgos are just a few of the familiar fruits that once attracted giant mammals. Barlow also combed the literature and conducted her own admittedly crude experiments to assess the likelihood that four North American natives—desert gourd, pawpaw, persimmon, and honey locust—all evolved fruits with dispersers other than their current ones in mind.

Neither are fruits the only anachronistic plant parts. Some plants bear thorns and spines far beyond the height that any modern

browsers can reach. Devil's walking stick, for instance, grows a nine-foot-tall prickly stem before it branches out. If the growing tip of the stem is bitten off, the plant loses precious time in its race to reach the sunlight and branch out, so it makes sense to defend the stem with prickles. But the defense is overkill. No browser exists today in the walking stick's native eastern deciduous forest habitat that could bite off the tip of a nine-foot-tall plant. The big herbivores of the Pleistocene, however, could have, and this probably accounts for the walking stick's profligate prickles.

North America's pronghorn antelope is a probable animal anachronism, an idea developed by mammalogist John A. Byers in his 1997 book, *American Pronghorn: Social Adaptations and the Ghosts of Predators Past*. Why, Byers asked, do these animals run so fast? Pronghorns can reach speeds of about 60 miles per hour and run 40 to 45 miles per hour for nearly two miles without tiring. No existing predators, such as wolves, coyotes, and pumas, come close to achieving such speed. But extinct American cheetahs likely did at one time, and pronghorns may still be running from their ghosts.

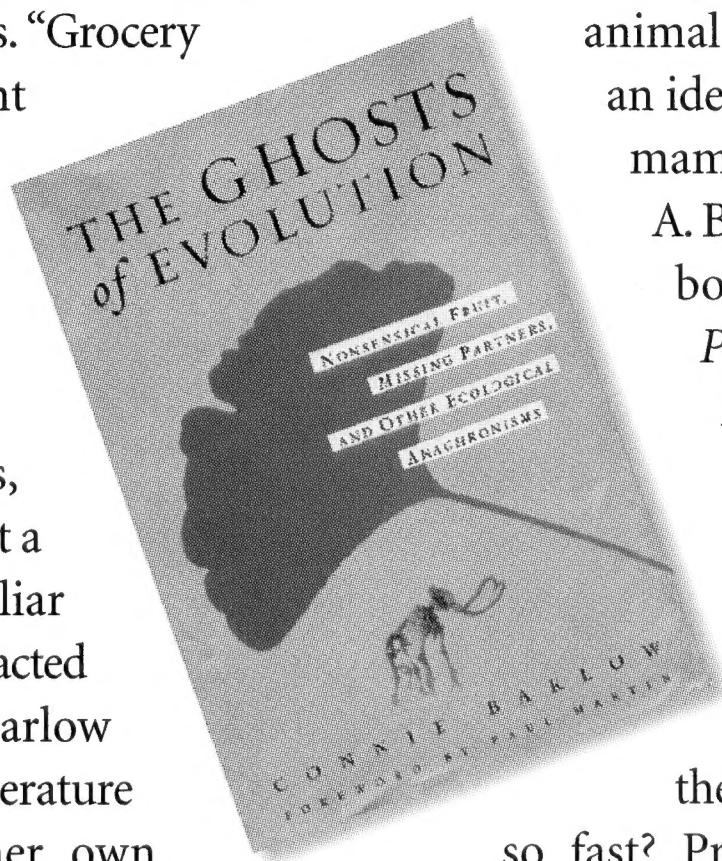
People seem to act as substitutes for the seed dispersers of some of

the fruit ghosts, reports Barlow. In some cases, people may do an even better job. She cites work by ecologist Gary Paul Nabhan, who found that of 112 species of New World tropical fruits likely eaten by extinct herbivores, at least 98 survive because people use them. Barlow writes, "In the Western Hemisphere, four out of five tropical and subtropical species ecologically stranded by the loss of their mutualists have been rescued, in part, by human attention. In the case of *Curcubita* [gourds, squashes, pumpkins, and similar plants]...we nurtured the lineage to newfound splendor."

But loss of dispersers may have dire consequences for some plants. Many African trees rely on highly endangered elephants for dispersal, for instance. Barlow quotes ecologist Richard Corlett, who wrote, "Loss of seed dispersal agents may, in the long term, be as serious a threat to tropical plant diversity as deforestation."

*The Ghosts of Evolution* is a fascinating, highly readable account of the natural history of the relationships between plants and animals. While sometimes her ideas are highly speculative, Barlow clearly separates hypotheses with scientific support from those that are pure conjecture. After reading her stories, you'll never again eat fruit without wondering how useful you might be in spreading its seeds—or without looking over your shoulder for ghosts.

—Susan Lumpkin





# BIO- ALMANAC

## GOOD NEWS

Sky-gazers  
from  
Wisconsin to  
Florida may



catch a peculiar but historic sight this coming October—a small flock of young whooping cranes (*Grus americana*) flying behind an ultralight aircraft. A natural population of 187 of these large, endangered cranes currently migrates between the Northwest Territories of Canada and the Aransas National Wildlife Refuge (NWR) along the Gulf Coast of Texas, but a single disaster in their small wintering grounds—hurricane, red tide, or chemical spill, for example—could wipe them out in an instant.

The U. S. Fish & Wildlife Service is hoping to improve the species' outlook by creating a second migratory population on the East Coast. On July 10, 2001, the U.S. Fish & Wildlife Service moved ten whooping crane chicks from their hatching site at Patuxent Wildlife Research Center in Laurel, Maryland, to their new summer home: Necedah National Wildlife Refuge in Necedah, Wisconsin. At Patuxent, the cranes were first exposed to the sounds of adult whooping cranes—and the whine of an ultralight's engine—while still in the egg. To keep the animals from imprinting on humans, handlers wore whooping crane hand-puppets to feed the hatchlings, and the birds were conditioned to regard both costumed handlers and the ultralight craft as "Mom."

At the Necedah NWR, the birds will be given a few months to get used to their new surroundings—and to develop flight feathers and strong flight muscles. When the time

is ripe, they will become the first whoopers to cross the eastern half of the U.S. in more than 100 years. You can check out a map of the expected migration route at [http://midwest.fws.gov/whoopingcrane/nep\\_map.html](http://midwest.fws.gov/whoopingcrane/nep_map.html).

## MORE GOOD NEWS, SORT OF

With our interest in saving giant pandas in the wild, environmental news from China is a subject of concern. Recently, the U.S. Embassy in Beijing's Environment, Science, and Technology Section reported that the Chinese Environment Minister released the country's "Year 2000 Report on the State of the Environment." The minister said the trend of worsening environmental pollution in China had been basically brought under control, with total emissions of major pollutants down 10-15 percent compared with 1995. Pollution levels remain unacceptably high, however, and ecological degradation has not been brought under control.

But environmental concern is growing among the Chinese people. A survey of 15,000 Chinese from throughout the country found that 68 percent were willing to accept higher taxes for a cleaner environment. Some 49 percent declared that environmental protection is China's most pressing issue (followed by crime and overpopulation), while 65 percent believe it is the world's biggest problem.

In one sign of this concern, Shaanxi Province has banned the production, sale, or use of disposable chopsticks. Statistics show that 25 million trees are cut down in

China each year in order to make 45 billion pairs of disposable wooden chopsticks. Xi'an City, capital of the province, is now conducting education campaigns aimed at enforcing the ban.

—from Beijing Environment, Science, and Technology Update (6/15/01)

## FOOD AT A SNAIL'S PACE

Originally leavened by one gourmet food critic's dismay at the opening of the first McDonald's in Rome in 1986, the "Slow Food" movement has slowly risen into an international organization dedicated to saving and savoring good food. Devoted initially to the sensual pleasures of eating well rather than quickly, Slow Food—whose logo is a snail—has emerged as a conservation movement with a unique twist. Proponents of Slow Food, who call themselves "eco-gastronomes," now espouse protecting biodiversity and the diversity of vegetables, meats, and cheeses; artisanal and regional specialty food products; and traditional agricultural and pastoral ways of life.

Slow Food's Ark USA program targets foods in danger of extinction, such as the Delaware Bay oyster, the Bourbon Red turkey breed from Tennessee, and wild rice from the lake regions of Minnesota and Wisconsin. Shade-grown coffee, a product promoted by the Zoo's Migratory Bird Center, also fits nicely within the Slow Food philosophy: Shade coffee saves habitat for birds, minimizes use of herbicides and pesticides, helps small farmers, and even tastes better than sun coffee. To learn more about Slow Food, visit the organization's tasteful website at [www.slowfood.com](http://www.slowfood.com). *Buon appetito!*

## WHAT'S IN A NAME?

"Bonobo" is most likely a misspelling of the word Bolobo, a small village in the Democratic Republic of Congo, the lone country inhabited by these gracile great apes. Another common name for the creature is "pygmy chimpanzee." This term too is somewhat of a misnomer, as the bonobo's average size is equal to or even larger than that of one chimp subspecies, the eastern or long-haired chimpanzee (*Pan troglodytes schweinfurthii*). Takayoshi Kano, a leading bonobo field biologist, instead prefers the name *elia* (plural *bilia*), an indigenous African name for the animal. The Congolese apparently never use the term bonobo, and communication between local inhabitants and scientists is pivotal to conservation efforts.

The bonobo's more appropriate scientific name, *Pan paniscus*, comes from the ancient Greek deity, Pan, a creature with a goat's body, a person's torso, and horns. Pan was a very playful deity—much like the bonobo—and was known for dancing to the sounds of his flute, frolicking in fields, and flirtatiously chasing nymphs through the forest.







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